

PATENT APPLICATION  
of  
LU HAO LENG  
for  
TABLE TOP  
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## TABLE TOP

**[0001]** This application claims priority under 35 U.S.C. § 119(a)-(d) to Chinese Patent Application No. 03269260.9, filed July 28, 2003 and Chinese Patent Application No. 03268739.7, filed July 1, 2003, which are expressly incorporated by reference herein.

## BACKGROUND

**[0002]** The present disclosure relates to a table and, in particular, to a table top. More particularly, the present disclosure relates to multi-component table tops.

## SUMMARY

**[0003]** A table top includes an exterior shell, an interior frame in an interior region defined by the exterior shell, and a core surrounded by the interior frame. The interior frame includes one or more rails and blocks coupled to the rails and located between the rails and the core.

**[0004]** In one illustrative embodiment of the disclosure, four rails are slidably connected to four corner blocks to provide a rectangular interior frame surrounding a cellular core, and two side blocks are also slidably connected to the rails. During assembly of the components to produce this table top, the two side blocks are slid on two of the rails to reach a selected position, and all of the rails are then slid into mating positions with the four corner blocks to establish the interior frame.

**[0005]** The cellular core is then placed in an interior space defined by the interior frame and the exterior shell is coupled to the interior frame to produce the table top. A table leg frame is arranged to underlie the exterior shell and is anchored using suitable fasteners to the corner and side blocks located in the interior region of the exterior shell.

**[0006]** In another illustrative embodiment of the disclosure, four side blocks are slidably connected to a circular rail to provide an interior frame surrounding a cellular core. During assembly of the components to produce this table top, a curved rail with two opposed ends is provided and in series four side blocks are slid onto the curved rail at one of these ends and moved along a curved path established by the

curved rail to assume predetermined circumferentially spaced-apart positions. The two opposed ends are then coupled to produce an "endless" circular rail carrying four spaced-apart side blocks.

[0007] The cellular core is then placed in an interior space defined by the interior frame and the exterior shell is coupled to the interior frame to produce the table top. A table leg frame is arranged to underlie the exterior shell and is anchored using suitable fasteners to the four side blocks located in the interior region of the exterior shell.

[0008] Additional features of the disclosure will become apparent to those skilled in the art upon consideration of the following detailed description of illustrative embodiments exemplifying the best mode of carrying out the disclosure as presently perceived.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The detailed description particularly refers to the following figures in which:

[0010] Fig. 1 is a perspective view of a table including a table top in accordance with a first embodiment of the disclosure;

[0011] Fig. 2 is an exploded perspective view of the table top of Fig. 1 showing, from top to bottom, a top sheet, a cellular core, an interior frame comprising four rails and six blocks that can be assembled to surround the core, a perimeter bumper configured to be mounted to an exterior portion of the interior frame, and a bottom sheet configured to cooperate with the top sheet and the perimeter bumper to form an exterior shell containing the cellular core and the interior frame;

[0012] Fig. 3 is an enlarged perspective view of a portion of the table top of Fig. 1, with portions broken away, showing the cellular core located in an interior region defined by the exterior shell, a first side block coupled to a first side rail and a first corner block coupled to the first side rail and to a first end rail to form a portion of the interior frame around the cellular core, and coupling of a portion of the perimeter bumper to the first side and end rails and to the first corner block;

[0013] Fig. 4 is an enlarged perspective assembly view of portions of the perimeter bumper, first side rail, and first side block of Fig. 3 suggesting how these components are coupled to one another;

[0014] Fig. 5 is a view similar to Fig. 4 taken from another point of view;

[0015] Fig. 6 is a perspective view of the components shown in Fig. 5 after assembly of the components and attachment of the top and bottom sheets to the interior frame;

[0016] Fig. 7 is a sectional view taken along line 7-7 of Fig. 6;

[0017] Fig. 8 is a top plan view of a portion of the table top of Fig. 1, with portions broken away, showing the first side block coupled to the first side rail;

[0018] Fig. 9 is an enlarged sectional view taken along line 9-9 of Fig. 8 showing portions of an exterior table leg frame mounted on an underside of the table top of Fig. 8;

[0019] Fig. 10 is an enlarged perspective assembly view of portions of the perimeter bumper, first side and end rails, and first corner block of Fig. 3 suggesting how those components are coupled to one another;

[0020] Fig. 11 is a view similar to Fig. 10 taken from another point of view;

[0021] Fig. 12 is a perspective view of some of the components shown in Fig. 11 after assembly of the components and attachment of the top and bottom sheets to the interior frame;

[0022] Fig. 13 is a top plan view of another portion of the table top of Fig. 1, with portions broken away, showing the first corner block coupled to the first side and end rails and to the perimeter bumper;

[0023] Fig. 14 is an enlarged sectional view taken along line 14-14 of Fig. 13 showing portions of an exterior frame coupled to the underside of the table top of Fig. 13;

[0024] Fig. 15 is a sectional view taken along line 15-15 of Fig. 13;

[0025] Fig. 16 is a perspective view of a table including a table top in accordance with a second embodiment of the disclosure;

[0026] Fig. 17 is an exploded perspective view of the table top of Fig. 16 showing, from top to bottom, a top sheet, a cellular core, an interior frame comprising a curved rail, two rigidifying beams, two small side blocks, and two larger side blocks

that can be assembled to surround the core, a portion of a bottom sheet, and a portion of a circular perimeter bumper that is configured to cooperate with the top and bottom sheets to form an exterior shell containing the cellular core and the interior frame;

[0027] Fig. 18 is an enlarged perspective view of a portion of the table top of Fig. 1, with portions broken away, showing a rigidifying beam and the cellular core located in an interior region defined by the exterior shell, a first side block coupled to the circular rail, and coupling of a portion of the perimeter bumper to the circular rail;

[0028] Fig. 19 is an enlarged perspective view of a small side block; and

[0029] Fig. 20 is an enlarged perspective view of a larger side block.

#### DETAILED DESCRIPTION

[0030] A table 10 includes a table top 12 and a table leg frame 14 including four legs 16 and supporting table top 12 in an elevated position as suggested in Fig. 1. A rectangular table top 12 is illustrated in Figs. 1-15 while a round table top 512 is illustrated in Figs. 16-20.

[0031] As shown in Fig. 2, table top 12 includes an exterior shell 18 including a top sheet 20, a bottom sheet 22, and a perimeter bumper 24. These components cooperate to form an interior region 26 containing an interior frame 28 and a core 30 when assembled, for example, as shown in Fig. 3.

[0032] Interior frame 28 includes first and second side rails 31, 32, first and second end rails 41, 42, and six blocks configured to be coupled to the rails to rigidify table top 12 and provide sturdy foundations to which table leg frame 14 may be mounted. In an illustrative embodiment, the rails are extruded and the blocks are injection-molded. In the illustrated embodiment, these blocks include first, second, third, and fourth corner blocks 51, 52, 53, and 54 and first and second side blocks 61, 62. The corner blocks add strength in the corners of table top 12 to act as shock absorbers and enhance "drop resistance" and "side impact resistance" of table top 12. It is within the scope of this disclosure to vary the number, spacing, and location of such blocks to meet structural and drop or side impact resistance needs of any particular table top.

[0033] Core 30 illustratively has a cellular structure as suggested in Fig. 3 and is made, for example, of corrugated material. Core 30 is sized and shaped to lie in a

space bounded by side rails 31, 32, end rails 41, 42, and blocks 51, 52, 53, 54, 61, and 62 and in interior region 26 formed in exterior shell 18. It is within the scope of this disclosure to form core 30 of any suitable material to add body to table top 12 in the region between top and bottom sheets 20, 22.

**[0034]** As shown in Fig. 2, core 30 is formed to include a first corner cutout 151 sized and located to receive first corner block 51 therein, a second corner cutout 152 sized and located to receive second corner block 52 therein, a third corner cutout 153 sized and located to receive third corner block 53 therein, and a fourth corner cutout 154 sized and located to receive fourth corner block 54 therein. Core 30 is also formed to include a first side cutout 161 sized and located to receive first side block 61 therein and a second side cutout 162 sized and located to receive second side block 62 therein. When assembled as shown, core 30 substantially fills the space between top and bottom sheets 20, 22 and inside interior frame 28 defined by rails 31, 41, 32, and 42 and blocks 61, 51, 52, 62, 53, and 54.

**[0035]** As suggested in Fig. 2, when assembled, corner blocks 51, 52, 53, 54 are used to retain side rails 31, 32 in spaced-apart parallel relation to one another and end rails 41, 42 in spaced-apart parallel relation to one another to define a rectangular interior frame 28. First corner block 51 is coupled to a first end 311 of first side rail 31 and a first end 411 of first end rail 41. Second corner block 52 is coupled to a second end 412 of first end rail 41 and a second end 322 of second side rail 32. Third corner block 53 is coupled to a first end 321 of second side rail 32 and to a second end 422 of second end rail 42. Fourth corner block 54 is coupled to a first end 421 of second end rail 42 and a second end 312 of first side rail 31. Illustrative "slide-initiated" couplings for corner blocks and rails are shown in Figs. 5, 10, and 11.

**[0036]** As also suggested in Fig. 2, when assembled, each side block 61, 62 will be coupled to one of side rails 31, 32 and arranged to lie about midway between first and second end rails 41, 42. Illustrative slide-initiated couplings for side blocks and rails are shown in Figs. 4 and 5. Core 30 will then be placed into a space bounded, in part, by assembled rails 31, 41, 32, and 42 and blocks 61, 51, 52, 62, 53, and 54 so that those blocks fit into the spaces provided by cutouts 161, 151, 152, 162, 153, and 154 formed in core 30.

**[0037]** Exterior shell 18 can be assembled and mounted to surround interior frame 28 and core 30 in many different yet suitable ways. In the illustrated embodiment, top sheet 20 and bottom sheet 22 are made of an ABS thermoplastic material and are coupled using, for example, a suitable adhesive material to one or more of exposed surfaces of rails 31, 41, 32, 42, corner blocks 51, 52, 53, 54, and core 30. Also in the illustrated embodiment, perimeter bumper 24 is coupled to perimeter portions of rails 31, 41, 32, 42 and corner blocks 51, 52, 53, 54 using, for example, a bumper retainer 134 that projects away from outer rim 33 of perimeter bumper 24 and is sized and shaped to mate with exposed bumper receivers 36 formed in rails 31, 41, 32, 42 and corner blocks 51, 52, 53, 54. It is within the scope of this disclosure to use other suitable means for mounting perimeter bumper 24 on interior frame 28.

**[0038]** As suggested in Figs. 8, 9, and 13-15, side blocks 61, 62 and corner blocks 51, 52, 53, 54 are configured to provide anchor foundations for anchoring table leg frame 14 in place on the underside of table top 12. Each block is formed to include one or more fastener receiver means 138 for receiving a fastener 139 included in table leg frame 14 to couple table leg frame 14 to bottom sheet 22 so that table leg frame 14 is anchored in a fixed position to bottom sheet 22 (or other suitable portion) of table top 12. In the illustrated embodiment, each fastener receiver means 138 is formed in a rigidifying member 50 included in each corner block 51, 52, 53, 54 or in a rigidifying member 60 included in each side block 61, 62.

**[0039]** First side rail 31 is coupled to first side block 61 and bumper retainer of perimeter bumper 24 as suggested in Figs. 4-7. Second side rail 32 is coupled to second side block 62 and bumper retainer 134 of perimeter bumper 24 in a similar manner.

**[0040]** First side block 61 includes a rigidifying member 60 arranged to lie adjacent to core 30 as shown in Fig. 3 and an interlock portion 69 appended to rigidifying member 60 and coupled to first side rail 31 as suggested in Figs. 4-7. In the illustrated embodiment, rigidifying member 60 comprises a honeycomb structure and interlock portion 69 is a T-shaped rail mount comprising a neck 63 cantilevered to rigidifying member 60 and a slide member 64 mounted on neck 63 to provide an elongated upwardly extending upper lip 65 and an elongated downwardly extending

lower lip 66 as shown best in Figs. 4 and 5. In the illustrated embodiment, first side block 61 is monolithic and made of a plastics material.

**[0041]** First side rail 31 includes a base 33 coupled to perimeter bumper 24 and formed to include bumper receiver 36. First side rail 31 also includes an interlock portion 34 appended to base 33 and formed to mate with interlock portion 69 included in first side block 61 as suggested in Figs. 4 and 5 and shown in Figs. 6 and 7. In the illustrated embodiment, first side rail 31 is monolithic and made of a plastics material.

**[0042]** Base 33 of first side rail 31 includes an upper strip 35 and a lower strip 37. Lower strip 37 is arranged to lie in spaced-apart parallel relation to upper strip 35 to provide therebetween an elongated channel (bumper receiver) 36 receiving a portion (e.g., bumper retainer 134) of perimeter bumper 24 therein to retain perimeter bumper 24 in a fixed position on first side rail 31 as shown, for example, in Figs. 3, 6, and 7.

**[0043]** First side rail 31 further includes elongated upper and lower flanges 38, 39 coupled to base 33 to establish interlock portion 34. Upper and lower flanges 38, 39 are arranged to provide therebetween a rail mount receiver 40 extending along a length of first side rail 31 as shown best in Fig. 5. As suggested in Figs. 4-7, the T-shaped rail mount (interlock portion) 69 of first side block 61 is arranged to extend into and slide back and forth in rail mount receiver 40 defined between upper and lower flanges 38, 39. Interlock portion 34 of first side rail 31 and interlock portion 69 of first side block 61 are coupled to one another and cooperate to define means for mounting rigidifying member 60 of first side block 61 for sliding movement relative to base 33 of first side rail 31 so that rigidifying member 60 can be moved to assume a selected position on base 33 during assembly of interior frame 28 and preparatory to insertion of core 30 in interior region 26 of exterior shell 18.

**[0044]** Each of the other rails 41, 32, and 42 has a structure that is the same as the structure of first side rail 31. Second side block 62 has the same configuration as first side block 61 and is coupled to second side rail 32 in the same manner as first side block 61 is coupled to first side rail 31. In the illustrated embodiment, each side block 61, 62 is slid on its companion side rail 31, 32 to reach a selected position during assembly of the components to produce table top 12.



**[0045]** Mating of a corner block to side and end rails is shown, for example, in Figs. 10-12. Although it is within the scope of this disclosure to couple distal ends of a side rail and an end rail to a corner block using any suitable coupling, in the illustrated embodiment, each corner block is formed to include a first corner interlock portion 691 for (slidably) mating with an interlock portion 34 included in a companion end rail (e.g., 41 or 42) and a second corner interlock portion 692 for (slidably) mating with an interlock portion 34 included in a companion side rail (e.g., 31 or 32).

**[0046]** As shown in Figs. 10 and 11, first corner block 51 includes a first corner interlock portion 691 coupled to rigidifying member 50 and configured to mate with interlock portion 34 on first end 411 of first end rail 41. First corner block 51 also includes a second corner interlock portion 692 coupled to rigidifying member 50 and configured to mate with interlock portion 34 on first end 311 of first side rail 31. Each of these corner interlock portions 691, 692 includes a neck 63 and a slide member 64 coupled to neck 63 to provide upper lip 65 and lower lip 66 and configured to mate with interlock portion 34 and to slide back and forth in rail mount receiver 40.

**[0047]** First corner block 51 also includes a substantially L-shaped bumper mount 80 having one end 801 arranged to lie in confronting relation to first end 411 of first end rail 41 and in close proximity to first corner interlock portion 691 as shown in Fig. 11. Bumper mount 80 also has a second end 802 arranged to lie in confronting relation to first end 311 of first side rail 31 and in close proximity to second corner interlock portion 692 as shown in Fig. 10. L-shaped bumper mount 80 is coupled to rigidifying member 50 and to perimeter bumper 24 and arranged to project outwardly from rigidifying member 50 to lie in a space located between first ends 411, 311 of first end and side rails 41, 31 as shown, for example, in Figs. 10 and 11.

**[0048]** Bumper mount 80 includes an upper strip 82 adapted to be coupled to top sheet 20 and a lower strip 84 adapted to be coupled to bottom sheet 22. Upper and lower strips 20, 22 are arranged to lie in spaced-apart relation to one another to provide therebetween an elongated channel defining bumper receiver 36 as shown in Figs. 10 and 11.

**[0049]** During assembly of the components to produce table top 12, the two side blocks 61, 62 are slid on the two side rails 31, 32 to reach a selected position, for

example, midway along the length of each side rail 31, 32. All of the side and end rails 31, 32, 41, 42 are then slid into mating positions with the companion interlock portions 691, 692 of the four corner blocks 53, 54, 55, 56 to form interior frame 28. Core 30 is then placed in an interior space defined by interior frame 28 and exterior shell 18 is coupled to interior frame 28 to produce table top 12. Table leg frame 14 is then arranged to underlie exterior shell 18 and is anchored using fasteners 139 to fastener receivers 138 formed in side and corner blocks 61, 62, 53, 54, 55, 56 located in interior region 26 of exterior shell 18.

**[0050]** A round table 510 in accordance with a second embodiment of the disclosure is illustrated in Fig. 16 and includes a table top 512 and a table leg frame 514. As shown in Figs. 16 and 17, a round table top 512 includes an exterior shell 518 including a top sheet 520, a bottom sheet 522, and a perimeter bumper 524. These components cooperate to form an interior region 526 containing an interior frame 528 and a core 530 when assembled, for example, as shown in Fig. 18. In the illustrated embodiment, interior frame 528 includes circular rail 500, first and second rigidifying beams 501, 502, and four side blocks 503, 504, 505, 506 coupled to circular rail 500.

**[0051]** Interior frame 528 includes circular rail 500 and in series first, second, third, and fourth side blocks 503, 504, 505, 506 slidably coupled to circular rail 500 for sliding movement along and around a circular path established by circular rail 500 to assume a selected position on circular rail 500 as suggested in Fig. 17. Once assembled, side blocks 503, 504, 505, 506 are arranged to lie in circumferentially spaced-apart relation about circular rail 500 as suggested in Fig. 16. Once the blocks are coupled to circular rail 500, first and second ends 507, 508 of circular rail 500 can be coupled to one another to form an endless loop. In the illustrated embodiment, blocks 504 and 506 have a first size and blocks 503 and 505 have a larger second size. The size difference is a function of the configuration of the size and shape of the table leg frame 514 underlying table top 512.

**[0052]** Once assembled, first, second, third, and fourth side blocks 503, 504, 505, 506 are arranged to lie in spaced-apart relation to one another about circular rail 500 to form "corners" of a "reference rectangle" 599 inscribed in circular rail 500 as suggested in Fig. 16. Like side blocks 61, 62 shown in Figs. 8 and 9, each side block

503, 504, 505, 506 includes fastener receiver means (not shown) for receiving a fastener (not shown but similar to fastener 139 in Fig. 9) arranged to couple table leg frame 514 to bottom sheet 522 so that table leg frame 514 is anchored in a fixed position on bottom sheet 522 of table top 512.

**[0053]** Interior frame 528 further includes a first rigidifying beam 501 having a first end coupled to circular rail 500 and an opposite second end coupled to circular rail. Interior frame 528 also includes a second rigidifying beam 502 having a first end coupled to circular rail 500 and an opposite second end coupled to circular rail 500. Although each beam 501, 502 illustratively has the same cross-section as side rail 61, it is within the scope of this disclosure to vary that cross-section to create a beam of suitable rigidity. Beams 501 and 502 are arranged to lie in spaced-apart parallel relation to one another as suggested in Fig. 17.

**[0054]** As suggested in Fig. 17, core 530 includes a first core portion 531 lying on one side of first rigidifying beam 501, a second core portion 532 lying on an opposite side of first rigidifying beam 501 and between beams 501 and 502, and a third core portion 503 lying between a portion of circular rail 500 and beam 502. Second core portion 502 lies on one side of second rigidifying beam 502 and third core portion 503 lies on an opposite side of second rigidifying beam 502.

**[0055]** As shown in Fig. 17, first core portion 531 is formed to include a first side cutout 603 sized and located to receive first side block 503 therein and a second side cutout 604 sized and located to receive second side block 504 therein. Third core portion 533 is formed to include a third side cutout 605 sized and located to receive third side block 505 therein and a fourth side cutout 606 sized and located to receive fourth side block 506 therein.

**[0056]** Circular rail 500 includes a base 533 coupled to perimeter bumper 524 and a curved interlock portion 534 appended to base 533. First side block 503 includes a rigidifying member 550 arranged to lie adjacent to cellular core 30 and a curved interlock portion 569 appended to rigidifying member 550. Curved interlock portions 534, 569 of circular rail 500 and first side block 503 are coupled to one another and cooperate to define interlock means for mounting rigidifying member 550 for sliding movement along a curved path relative to base 533 so that rigidifying member 550 can be moved to assume a selected position on base 533 of circular rail

500 during assembly of interior frame 528 and preparatory to insertion of cellular core 530 in interior region 526 of exterior shell 518.

**[0057]** Base 533 of circular rail 500 includes a curved upper strip 535 and a curved lower strip 537 arranged to lie in spaced-apart relation to curved upper strip 535 to provide therebetween an elongated curved channel 536 receiving a portion 134 of the perimeter bumper 524 therein to retain perimeter bumper 524 in a fixed position on circular rail 500.

**[0058]** Circular rail 500 also includes curved upper and lower flanges 538, 539 arranged to provide therebetween a curved rail mount receiver 540 extending along a curved length of circular rail 500. First side block 504 includes a pie-shaped rigidifying member 550 arranged to lie adjacent to cellular core 530 and a curved rail mount (interlock portion) 569 appended to rigidifying member 550 and arranged to extend into the curved rail mount receiver 540 defined between curved upper and lower flanges 538, 539. Curved rail mount 569 includes a curved T-shaped rail mount comprising a curved neck 563 cantilevered to rigidifying member 550 and a curved slide member 564 mounted on curved neck 563 to provide an elongated upwardly extending curved upper lip 565 and an elongated downwardly extending curved lower lip 566 as shown best in Fig. 20.

**[0059]** During assembly of the components to produce table top 512, a curved rail 500 with two opposed ends 507, 508 is provided and in series four side blocks 503, 504, 505, 506 are slid onto curved rail 500 at one of those ends 507, 508 and moved along a curved path established by the curved rail to assume circumferentially spaced-apart positions as suggested in Fig. 17. The two opposed ends 507, 508 are then coupled to produce an "endless" circular rail carrying four spaced-apart side blocks. Perimeter bumper 524 is coupled to circular rail 500. Top and bottom sheets 520, 522 are coupled to one or more of circular rail 500, beams 501, 502, and core 530 to retain core 530 in interior region 526 of exterior shell 518. Table leg frame 514 is then arranged to underlie exterior shell 518 and is anchored using suitable fasteners (not shown) to fastener receivers (not shown) formed in side blocks 503, 504, 505, 506 located in interior region 526 of exterior shell 18.